

# Technical Update

## for Municipal Drinking Water Systems

### Treatment Equipment Requirements

The new Drinking-Water Systems Regulation (O. Reg. 170/03) under the *Safe Drinking Water Act, 2002* (SDWA) establishes the treatment equipment requirements for drinking water systems through two separate schedules, one applicable to municipal residential drinking water systems (Schedule 1), and the other to municipal non-residential systems as well as all regulated non-municipal systems (Schedule 2). These requirements replace the minimum treatment requirements under the former Drinking Water Protection Regulation (O. Reg. 459/00) under the *Ontario Water Resources Act* (OWRA).

This Update summarizes the treatment equipment requirements of O. Reg. 170/03 applicable to municipal residential and non-residential systems, compares them to the requirements of the former O. Reg. 459/00 under the *Ontario Water Resources Act* (OWRA), and identifies the treatment equipment requirements in the existing approvals issued on the basis of O. Reg. 459/00 under the OWRA that take precedence over the requirements of O. Reg. 170/03. This Update also makes reference to the new *Procedure for Disinfection of Drinking Water in Ontario* and its relationship to O. Reg. 170/03.

#### **Applicability of the treatment equipment requirements under Schedules 1 and 2**

Schedules 1 and 2 of O. Reg. 170/03 are essentially identical with respect to the actual levels of treatment required. The differences lie in the dates by which the subject drinking water systems are required to achieve compliance with the minimum levels of treatment, and the types of persons that may determine equivalency of an alternate type of treatment equipment.

Based on the definitions of *municipal and residential* drinking water systems set out in the *Safe Drinking Water Act, 2002*, and in O. Reg. 170/03, Schedule 1 (applicable to all municipal residential systems) applies to the following drinking water systems:

- any drinking water system owned by a municipality or a municipal service board or a corporation established under the Municipal Act that is serving six or more private residences, and
- any drinking water system from which a municipality obtains or will obtain water for the purpose of serving six or more private residences under a contract between the municipality and the owner of the system.

It should be noted that, in accordance with these definitions, Schedule 1 does not apply to some of the drinking water systems for which consolidated Certificates of Approval (with specific dates for compliance with the treatment requirements) were issued on the basis of the ministry's review of Engineers' Reports submitted in accordance with O. Reg. 459/00. These include:

- non-residential drinking water systems owned or operated by a municipality or Ontario Clean Water Agency (OCWA),
- non-municipal residential drinking water systems operated by a municipality, and
- non-municipal residential drinking water systems owned or operated by OCWA.

Although these systems are subject to the treatment requirements set out in Schedule 2, and also are no

longer subject to the approvals requirements, O. Reg. 170/03 stipulates that the owner of every such system that has a Certificate of Approval issued on or after August 1, 2000 must still comply with the treatment requirements by the date set by the conditions of their approval, and is subject to other requirements of the approval until the approval is revoked when the system comes in compliance with the treatment requirements. (See the technical update titled *Approval Requirements for Drinking Water Systems* for more detail.)

**Minimum levels of treatment and treatment equipment requirements**

O. Reg. 170/03 establishes specific requirements for the minimum levels of treatment that must be provided and the types and capabilities of treatment processes and equipment that can be used in achieving these levels of treatment when drinking water is being produced and distributed to the public.

The requirements for drinking water systems using groundwater as a source of raw water, differ from those using surface water, which include groundwater under the direct influence of surface water. Also, the Regulation makes a clear distinction between the requirements applicable to the processes of primary and secondary disinfection.

In addition, the Regulation requires that the **Procedure for Disinfection of Drinking Water in Ontario** be used to provide clarification of the specific regulatory treatment requirements. This document must be used to determine the treatment capabilities of various treatment processes (including pathogen removal credit allocations) and the requirements related to the operation of treatment equipment.

The prescribed treatment requirements may be summarized in the following table:

<p><b>Drinking water systems that obtain all their water from a raw water supply that is groundwater</b></p>	<ul style="list-style-type: none"> <li>• Must have water treatment equipment that is designed to be capable of achieving, at all times, <b>primary disinfection</b> in accordance with the ministry's <i>Procedure for Disinfection of Drinking Water in Ontario</i>, including at least 99 per cent removal or inactivation of viruses.</li> <li>• Must operate the equipment in accordance with the <i>Procedure for Disinfection of Drinking Water in Ontario</i>, and in such a manner that it achieves the required level of treatment.</li> </ul>
<p><b>Drinking water systems that obtain their water from a raw water supply that is surface water</b></p>	<ul style="list-style-type: none"> <li>• Must have water treatment equipment that is designed to be capable of achieving, at all times, <b>chemically assisted filtration and primary disinfection</b> in accordance with the ministry's <i>Procedure for Disinfection of Drinking Water in Ontario</i>, including at least 99 per cent removal or inactivation of <i>Cryptosporidium</i> oocysts, 99.9 per cent removal or inactivation of <i>Giardia</i> cysts, and 99.99 per cent removal or inactivation of viruses. Other water treatment equipment, which in the Director's opinion (site specific approval for municipal residential systems) or professional engineer's opinion (Engineering Evaluation Report for municipal non-residential systems and all non-municipal systems), is designed to produce water of equal or better quality, is also acceptable.</li> <li>• Must operate the equipment in accordance with the <i>Procedure for Disinfection of Drinking Water in Ontario</i>, and in such a manner that it achieves the required level of treatment.</li> </ul>
<p><b>Drinking water systems that are not using a Point of Entry treatment approach</b></p>	<ul style="list-style-type: none"> <li>• Must have <b>secondary disinfection</b> equipment designed to be capable of achieving at all locations within the distribution system <ul style="list-style-type: none"> <li>• a free chlorine residual of 0.2 mg/L, for systems that provide chlorination but do not provide chloramination, or</li> <li>• a combined chlorine residual of 1.0 mg/L, for systems that provide chloramination, or</li> </ul> </li> </ul>

- other water treatment equipment, which in the Director's opinion (site specific approval for municipal residential systems), or professional engineer's opinion (Engineering Evaluation Report for municipal non-residential systems and all non-municipal systems), is designed to provide equivalent or better secondary disinfection.
- Must operate the equipment in accordance with the *Procedure for Disinfection of Drinking Water in Ontario*, and in such a manner that at all times and at all locations within the distribution system
  - the free chlorine residual is never less than 0.05 mg/L, for systems that provide chlorination but do not provide chloramination, or
  - the combined chlorine residual is never less than 0.25 mg/L, for systems that provide chloramination.

**For all drinking water systems**

the selection and design of specific processes and equipment for **primary disinfection**, **chemically assisted filtration and primary disinfection**, and **secondary disinfection** must conform with the requirements contained in the *Procedure for Disinfection of Drinking Water in Ontario*.

**For all large municipal residential systems**

the disinfection equipment must have a recording device that continuously records the performance of the disinfection equipment.

*Note: Secondary disinfection is not required if all parts of the drinking water system and all of the plumbing connected to the drinking water system that are downstream of the filtration and primary disinfection equipment are enclosed in a building or other protective structure.*

**Treatment requirements under O. Reg. 170/03, the former O. Reg. 459/00, and in conditions of existing Certificates of Approval**

Effective June 1, 2003, new treatment requirements under O. Reg. 170/03 replaced the requirements of O. Reg. 459/00 (now revoked).

The main difference between O. Reg. 459/00 and O. Reg. 170/03 with respect to the treatment equipment requirements is that O. Reg. 170/03 sets different dates of compliance for different categories of drinking water systems, while O. Reg. 459/00 set a single date of compliance for all systems. On a case-by-case basis, this date may have been changed by the Director through conditions of individual Certificates of Approval issued after August 1, 2000.

- Under O. Reg. 170/03, the compliance date for the installation of treatment equipment for existing municipal residential drinking water systems was July 1, 2003. Compliance dates for municipal non-residential systems that commenced operation prior to June 1, 2003 are described in Schedule 2 of the regulation.

- However, these dates do not apply to any drinking water system for which an approval issued on or after August 1, 2000 already specifies a date by which the system is required to be in compliance with the minimum treatment requirements under O. Reg. 459/00 that is later than June 1, 2003. In all these cases, the compliance date specified in an approval will remain in force unless it is changed by the Director through an amendment to that approval.

Any new system (i.e., systems commencing operations after June 1, 2003) must be in compliance with minimum treatment requirements when they commence operation.

With respect to the minimum levels of treatment, the requirements of O. Reg. 170/03 are essentially the same as those under O. Reg. 459/00. The difference lies in the manner in which the minimum levels of treatment were set by the two regulations.

- O. Reg. 459/00 set the requirements in general terms (i.e., disinfection for groundwater, filtration and disinfection for surface water, and presence of

a persistent disinfectant in the distribution system). That regulation addressed specifics of the requirements through a reference to the Ontario Drinking Water Standards, which included *Procedure B13-3 - Chlorination of Potable Water Supplies in Ontario* ("chlorination procedure").

- O. Reg. 170/03, on the other hand, sets out these same general requirements but also sets specific minimum levels of pathogen removal or inactivation for the required specific types of treatment processes, and minimum concentrations of disinfectant residual in distribution systems. In addition, O. Reg. 170/03 requires that the new *Procedure for Disinfection of Drinking Water in Ontario* ("disinfection procedure"), which replaced the "chlorination procedure", be used to provide clarification of the specific treatment requirements. This document is to be used to determine the treatment capabilities of various treatment processes (including pathogen removal credit allocations) and the requirements related to the operation of treatment equipment.

#### **Procedure for Disinfection of Drinking Water in Ontario**

*The Procedure for Disinfection of Drinking Water in Ontario* ("disinfection procedure") is a Ministry of the Environment procedure supporting O. Reg. 170/03 on:

- disinfection (primary disinfection), including any pre-disinfection treatment (e.g. chemically-assisted filtration), necessary to be credited with the required level of removal or inactivation of pathogens potentially present in the raw water supply (groundwater, surface water, or groundwater under direct influence of surface water);
- the maintenance of a disinfectant residual wherever it is required in a distribution system or plumbing (secondary disinfection);
- control of disinfection by-products; and
- disinfection following drinking water system construction or repair.

The disinfection procedure provides clarification for the selection of specific types of treatment processes and equipment (including monitoring equipment), and for determining the design capabilities and operational requirements for the purpose of compliance with the Regulation, including the pathogen removal credits attributable to certain processes and/or designs. The disinfection procedure is adopted by reference in O. Reg. 170/03. It replaces the ministry's *Procedure B13-3, Chlorination of Potable Water Supplies in Ontario, January, 2001*.

#### **Situations where a system may not have to comply with treatment requirements**

Under section 38 of the Safe Drinking Water Act, 2002, the Director, through conditions of an approval, may provide relief from a regulatory requirement related to water treatment ("partial relief") if a written application is made in accordance with the requirements of that section of the Act.

Under Schedules 4 and 5 of O. Reg. 170/03, the Director may consider issuing an approval with a condition granting relief from all regulatory requirements related to water treatment in Schedules 1 and 2 ("full relief"), but only when the owner's application made under section 38 of the Act relates to a system that obtains all of its water from a raw water supply that is groundwater.

For such an application for "full relief" to be considered by the Director, the owner must ensure that all of the requirements set out in Schedule 4 (municipal residential systems) or Schedule 5 (municipal non-residential systems and non-municipal systems) of the regulation have been met. These requirements include a written assessment prepared by a hydrogeologist (for municipal residential systems) or professional engineer (for non-residential systems) and public consultation on

the proposed relief condition undertaken prior to submitting the application. An application for “full relief” will be rejected if any of these requirements are not met, or the application involves a system that obtains all or some of its water from a raw water supply that is surface water, including groundwater under the direct influence of surface water. The regulation also prohibits the Director from granting an approval for “full” relief for a period that exceeds five years. Owners must re-apply near the end of that period if they wish for “full” relief to continue.

Note: Neither O. Reg. 170/03 nor the Act set any specific application requirements or approval prohibitions or requirements regarding granting regulatory relief other than relief from all treatment requirements (“full relief”). In all other cases, such as relief from only some of the treatment requirements or relief from non-treatment requirements (e.g., monitoring or reporting), the application requirements and restrictions will be set on a case-by-case basis in pre-application consultation with the ministry.

**Status of previously granted relief from treatment, monitoring or reporting requirements**

Under O. Reg. 170/03, any relief from a water treatment or water quality monitoring or reporting requirement granted in accordance with O. Reg. 459/00 through conditions of an approval issued on or after August 1, 2000 remains in force unless subsequently changed by the Director through an individual amendment to that approval.

However, the requirements of the new Regulation take precedence over an approval granted before August 1, 2000 if that approval provided for requirements that are less stringent than the requirements of the Regulation.

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